Transcriptional regulation of ethylene biosynthetic and signalling pathways in *hevea brasiliensis*

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Ethylene plays a pleiotropic role in plant growth and development processes, and defence. One of its most economically important roles is the regulation of natural rubber production in *Hevea brasiliensis*. Ethephon, an ethylene generator, is applied to rubber tree bark at the tapping panel to increase rubber yield by stimulating latex flow and regeneration between two tappings. Ethephon is a stimulator of many activities associated with latex cells related to the induction of numerous genes. Excessive environmental and harvesting stresses can lead to the Tapping Panel Dryness (TPD), a physiological disorder, triggered by oxidative stress in latex cells and usually associated with endogenous ethylene production. In order to understand the key regulators of latex production and TPD, the transcriptional regulation of ethylene biosynthetic and signalling pathways was studied in details using real-time RT-PCR analysis.

Ethylene biosynthesis involved several enzymes belonging to multigene families. Analysis of rubber clones with contrasting latex metabolism revealed that clone PB 260 with high metabolism has a constitutive activation of ethylene biosynthetic genes, whereas clone PB 217 with low metabolism requires exogenous ethylene stimulation. Ethylene Response Factors (ERFs) belong to a large family of transcription factor. ERFs have been shown to act as activators or repressors of downstream ethylene responsive genes. The members of this family were identified from five tissue-type libraries produced by the pyrosequencing GS-FLX 454 technique. The classification of ERFs in ten groups was carried out by alignment of the conserved AP2 domain. Transcript accumulation was analysed in various tissues at different stages of plant development including somatic embryogenic tissues, and in response to abiotic factors and latex harvesting treatments. Several biomarkers were identified especially for the TPD. This study led to propose a first model of regulation for the ethylene biosynthesis and signalling in *Hevea*.

2èmes journées thématiques transversales de l'UMR DIADE

METABOLISME ENVIRONNEMENT DEVELOPPEMENT

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Agropolis International

25 - 26 octobre 2012
http://metabolendev.mpl.ird.fr

Amphithéâtre Agropolis, Jeudi 25 octobre

12h30-13h30 **Accueil des participants**

Présentation des 2èmes journées thématiques transversales de l'UMR DIADE

13h30-13h45 **Serge Hamon** (Directeur de l'UMR DIADE), Représentants et comité d'organisation

Introduction générale

13h45-14h15 **Bertrand Muller** LEPSE, INRA Montpellier
Métabolisme et croissance face aux stress abiotiques : qui contrôle qui ?

Session 1 : Régulation du métabolisme en relation à l'environnement

Animateurs : Thierry Joët et Martine Devic

14h15-14h45 **Gilles Peltier** LB3M, CEA Cadarache
Contrôle environnemental et génétique de la production d'hydrogène et de l'accumulation de triglycérides chez Chlamydomonas.

14h45-15h15 **Riza Putranto** AGAP, CIRAD Montpellier
Régulation transcriptionnelle de la synthèse du latex chez l'hévéa.

15h15-15h35 Pause café

15h35-16h05 **David Macherel** IRHS, Université d'Angers
Adaptations et fonctionnement des mitochondries en conditions extrêmes.

16h05-16h20 **Thierry Joët** DIADE
Effets de l'environnement sur l'accumulation des composés de réserves dans le grain de café.

16h20-16h35 **Claudine Campa** DIADE
Métabolisme phénolique : acteur passé et présent de l'adaptation des plantes à l'environnement.

Session 2 : Régulation du métabolisme en relation au développement

Animateurs : Fabienne Morcillo et Thomas Roscoe

16h35-17h05 **Sébastien Baud** IJPB, INRA Versailles
Transcriptional regulation of fatty acid metabolism in Arabidopsis thaliana.

17h05-17h35 Danièle Werck IBMP, CNRS Strasbourg
Versatility of cytochrome P450 enzymes in the metabolism of monoterpenols and modulation of flower volatiles emission.

17h35-17h50 **Fabienne Morcillo** DIADE
Le palmier à huile : un modèle original pour étudier la biosynthèse de lipides.

Buffet diner ouvert à tous les participants au centre IRD de 18h00 à 20h00.

Amphithéâtre Agropolis, Vendredi 26 octobre

8h45-9h15 **Jérôme Pelloux** BPI, Université de Picardie Jules Verne Amiens
Roles of PME/PMEI-mediated changes in pectins during plant development.

9h15-9h45 **Jacqueline Grima-Pettenati** LRSV, CNRS Toulouse
Régulation du metabolisme des lignines et de la production de biomasse lignocellulosique.

9h45-10h00 **Timothy Tranbarger** DIADE
Ethylene coordinated transcriptional regulation of pectin metabolism during oil palm fruit shedding.

10h00-10h15 **Thomas Roscoe** DIADE
Regulation of carbon partitioning during oilseed development.

Session 3 : Régulateurs/senseurs du Métabolisme

Animateur : Timothy Tranbarger

10h15-10h45 **Philippe Nacry** BPMP, INRA Montpellier
The Arabidopsis NRT1.1 transporter acts as a nitrate sensor and governs root growth via modification of local auxin concentration.

10h45-11h05 Pause café

11h05-11h35 **Christian Meyer** IJPB, INRA Versailles
Rôle de la kinase TOR (Target of Rapamycin) dans la régulation du métabolisme primaire des plantes.

11h35-12h05 **Jean-Jacques Bessoule** LBM, CNRS Bordeaux
Plant fatty acid composition as marker of soil quality

12h05-12h20 **Christian Jay-Allemand** DIADE
Les flavonoides seraient-ils un "signal" d'origine foliaire perturbant l'architecture racinaire lorsque les plantes sont soumises à des stress lumineux ?

12h20-12h35 **Hassen Gherbi** DIADE
Signalisation et dialogue moléculaire dans la symbiose fixatrice d'azote actinorhizienne

12h35-12h45 **Le mot de la fin**

Buffet déjeuner ouvert à tous les participants au Centre IRD salle 151-161 de13h00-14h00.